Don R. Hush

Group CCS-3	Phone:	505-665-2722	
MS B265	FAX:	505-665-5220	
Los Alamos National Laboratory	Email:	dhush at lanl.gov	
Los Alamos, NM 87545	Web Page:	http://www.c3.lanl.gov/∼dhush	

Education

PhD Elec Eng	1986	University of New Mexico
MS Elec Eng	1982	Kansas State University
BS Elec Eng	1980	Kansas State University (Summa Cum Laude)

Professional Experience

1998–present	Technical Staff Member, Los Alamos National Laboratory
1993–1998	Associate Professor, Computer Engineering, University of New Mexico
1987–1993	Assistant Professor, Computer Engineering, University of New Mexico
Summer 1991,1994,1996	Visiting Professor, Universidad de Vigo, Vigo, Spain
1986–1987	Technical Staff Member, Sandia National Laboratories (SNL)

Areas of Expertise

Machine Learning, Pattern Recognition, Neural Networks,
Signal & Image Processing, Algorithms & Data Structures

Professional Activities

Senior Member, IEEE
Associate Editor, IEEE Transactions on Neural Networks, 1994-1997
Associate Editor, Signal Processing Magazine, 1994-1998

Publications

Book (Digital Signal Processing):	1
Journal Papers:	31
Conference Papers:	70+
Science Citations (1985-2008):	587+

Practical Experience

Don has practical experience in a variety of application areas that involve pattern recognition, anomaly detection, parameter estimation, signal prediction, object tracking, and signal detection. Applications where he has played a leading technical role include: detection, tracking and identification of narrowband signals in broadband noise; real-time video motion detection, tracking and classification; handwritten character recognition; automatic scene segmentation for hyperspectral image data; detection and quantification of lesions in medical imaging; visual inspection of manufactured components for the medical industry; automatic damage detection in rotating machinery; automatic target detection and classification in synthetic aperature radar (SAR) images; advanced arbitration algorithms for RFID systems; noninvasive prediction of glucose levels using spectroscopic measurements; fraud detection for the IRS and HCFA (Medicare); computer network intrusion detection;

asymmetry detection in hydrocode simulations; image restoration for OCR systems; prediction of material properties from high speed video (movies) of the machining process; detecting anomalous flows in computer network traffic; adaptive prediction of protocols in encrypted network traffic; anomaly detection for color images; anomaly detection for social network graphs; text classification; structural health monitoring and damage assesment for ships and small-scale structure models; prediction of protein-ligand pair bonding; and detection of nuclear materials via portal monitoring.

Journal Publications

I. Steinwart, D. Hush, and C. Scovel, "Learning from Dependent Observations," Journal of Multivariate Analysis, Vol. 100, pp. 175-194, 2009.

C. Scovel, D. Hush, and I. Steinwart, "Approximate duality," Journal of Optimization Theory and Applications, 135:3, 429–443, 2007.

D. Hush, C. Scovel, and I. Steinwart, "Stability of Unstable Learning Algorithms," Machine Learning 67:3, pp. 197–206, 2007.

I. Steinwart, D. Hush and C. Scovel, "A new concentration result for regularized risk minimizers," IMS Lecture Notes Monograph Series 2006, Vol. 51, 260-275.

I. Steinwart, D. Hush, and C. Scovel, "An Explicit Description of the Reproducing Kernel Hilbert Spaces of Gaussian RBF Kernels," IEEE Trans. on Information Theory, Vol. 52, pp. 4635-4643, 2006.

D. Hush, P. Kelly, C. Scovel, and I. Steinwart, "QP Algorithms with Guaranteed Accuracy and Run Time for Support Vector Machines," Journal of Machine Learning Research, vol. 7, pp. 733-769, 2006.

I. Steinwart, D. Hush, and C. Scovel, "Learning rates for density level detection," Analysis and Applications, Vol. 3, No. 4, pp. 356-371, 2005.

I. Steinwart, D. Hush, and C. Scovel. "A classification framework for anomaly detection," Journal of Machine Learning Research, vol. 6, pp. 211-232, 2005.

D. Hush and C. Scovel. "Concentration of the Hypergeometric Distribution," Statistics and Probability Letters, Volume 75, Issue 2 , pp. 127-132, November 2005.

D. Hush and C. Scovel. "Fat-shattering of affine functions," Combinatorics Probability and Computing, Vol. 13, No. 3, pp. 353–360, 2004.

M. Cannon, M. Fugate, D. Hush, and C. Scovel. "Selecting a Restoration Technique to Minimize OCR Error," IEEE Transactions on Neural Networks, v. 14, No 3. pp. 478–490, May 2003.

A. Cannon, M. Ettinger, D. Hush, and C. Scovel, "Machine learning with data dependent hypothesis classes," Journal of Machine Learning Research, Vol. 2, pp. 335-358, 2002.

D. Hush and C. Scovel, "Polynomial-time decomposition algorithms for support vector machines," Machine Learning, Vol. 51, pp. 51-71, 2003.

M. Fugate, D. Hush, C. Scovel, and R. Christensen, "An equivalence relation between parallel calibration and principal component regression," Journal of Chemometrics, Vol.

16, pp. 68-70, 2002.

D. Hush and C. Scovel, "On the VC dimension of bounded margin classifiers," Machine Learning, v. 45, pp. 33-44, 2001.

D.R. Hush, "Training a sigmoid node is hard," Neural Computation, Vol. 11, pp. 1249-1260, 1999.

T. Draelos and D. Hush, "A constructive neural network algorithm for function approximation using locally fit sigmoids," International Journal of Artificial Intelligence Tools, Vol. 7, No. 3, pp. 373-398, 1998.

D.R. Hush and B. Horne, "Efficient algorithms for function approximation with piecewise linear sigmoidal networks," IEEE Trans. Neural Networks, Vol. 9, No. 6, pp. 1129-1141, 1998.

C. Abdallah, G. L. Heileman, M. Georgiopoulos and D.R. Hush, "An overview of neural network results for systems and control," J. of Intelligent Control and Systems, Vol. 1, No. 2, pp. 177-194, 1996.

M.M. Moya and D.R. Hush, "A constrained second-order network with multiple objective optimization for one-class classification," Neural Networks, Vol. 9, No. 3, pp. 463-474, 1996.

B. Horne and D.R. Hush, "Bounds on the complexity of recurrent neural network implementations of finite state machines," Neural Networks Vol. 9, No. 2, pp. 243-252, 1996.

B. Horne and D.R. Hush, "On the node complexity of neural networks," Neural Networks, Vol. 7, No. 9, pp. 1413-1426, 1994.

P.M. Kelly, D.R. Hush, and J.M. White, "An adaptive algorithm for modifying hyperellipsoidal decision surfaces," Journal of Artificial Neural Networks, Vol. 1, No. 4, pp. 459-480, 1994.

R.J. Fogler, L.D. Hostetler, and D.R. Hush, "SAR Clutter Suppression Using Probability Density Skewness," IEEE Transactions on Aerospace and Electronics, Vol. 30, No. 2, pp. 621-625, April 1994.

D. Hush, C. Abdallah, and B. Horne, "The Recursive Neural Network and its Applications in Control Theory," Computers and Electrical Engineering, Vol. 19, No. 4, pp. 333-341, 1993.

D.R. Hush, B. Horne, and J.M. Salas, "Error Surfaces for Multi-layer Perceptrons," IEEE Trans. on Systems, Man, and Cybernetics, Vol. 22, No. 5, September 1992.

D.R. Hush, and B. Horne, "An Overview of Neural Networks, Part II: Dynamic Networks," Revista Espanola de Informatica y Automatica, Vol. 25, No. 2, pp. 17-32, 1992.

D.R. Hush, and B. Horne, "An Overview of Neural Networks, Part I: Static Networks," Revista Espanola de Informatica y Automatica, Vol. 25, No. 1, pp. 19-36, 1992.

D.M. Etter and D.R. Hush, "A new technique for adaptive frequency estimation and tracking," IEEE Trans. Acoust., Speech, Signal Processing, vol. ASSP-35, no. 4, April 1987, pp. 561-564.

D. Hush, N. Ahmed, R. David, "Instantaneous frequency estimation using adaptive linear predictor weights," IEEE Trans. Aerospace and Electronic Systems, vol. AES-22, No. 4, July 1986, pp. 442-431.

D. Hush, N. Ahmed, R. David, and S. Stearns, "An adaptive IIR structure for sinusoidal enhancement, frequency estimation, and detection," IEEE Trans. Acoust., Speech, Signal Processing, Vol. ASSP-34, No. 6, December 1986, pp. 1380-1390.